

I claim:

1. A method for measuring in real time or near real time the effectiveness of a sweep for cleaning a borehole drilled with drilling fluid, said method comprising:
 - providing the volume, density, and at least one rheological property of the drilling fluid;
 - providing a baseline equivalent circulating density of said drilling fluid;
 - providing the volume, density, and at least one rheological property of the sweep;
 - pumping said sweep into said borehole and circulating said sweep in said borehole;
 - measuring in real time or near real time the downhole density of said sweep during said pumping and during said circulating of said sweep as a function of time and measuring in real time or near real time the pump rate during said pumping;
 - providing the specific gravity of the subterranean formation;
 - calculating in real time or near real time the total equivalent circulating density;
 - determining in real time or near real time the sweep's contribution to the total equivalent circulating density; and
 - calculating in real time or near real time the sweep efficiency.
2. The method of claim 1 further comprising:
 - determining in real time or near real time the downhole pressure and temperature during said sweep; and
 - adjusting in real time or near real time said volume, density, or at least one rheological property of said drilling fluid or said sweep as a function of said downhole pressure and temperature.
3. The method of claim 1 wherein said baseline equivalent circulating density and said total equivalent circulating density are obtained from measurement of the hydrostatic pressure in the borehole with the time vertical depth of the sweep in the borehole.
4. The method of claim 1 wherein said baseline equivalent circulating density and said total equivalent circulating density are measured with a pressure-while-drilling tool inserted in the drill string.
5. A method for determining in real time or near real time the effectiveness of a sweep for cleaning a borehole drilled employing drilling fluid, said method comprising:

determining in real time or near real time the equivalent circulating density for the drilling fluid before addition of the sweep;
determining in real time or near real time the equivalent circulating density for the drilling fluid with the sweep;
determining in real time or near real time the rate of addition of the sweep into the borehole; and
calculating in real time or near real time the sweep efficiency using the formula:

$$SE = \frac{ECD_{Total} - ECD_{Base}}{\text{pump rate}}$$

where SE is sweep efficiency and ECD is equivalent circulating density.

6. The method of claim 5 wherein said equivalent circulating density is obtained from measurement of the hydrostatic pressure in the borehole with the time vertical depth of the sweep in the borehole.
7. The method of claim 5 wherein said equivalent circulating density is measured with a pressure-while-drilling tool inserted in the drill string.
8. A method for removing built-up drill cuttings from a borehole, said method comprising employing a sweep wherein said sweep is selected as the more efficient sweep from a group of sweeps tested in real time at the wellsite using pressure-while-drilling data and calculations of sweep efficiency.
9. The method of claim 8 wherein said calculations of sweep efficiency are made using the formula:
$$SE = \frac{ECD_{Total} - ECD_{Base}}{\text{pump rate}}$$

where SE is sweep efficiency and ECD is equivalent circulating density.
10. The method of claim 8 wherein the more efficient sweep is the sweep that results in the greater recovery of drill cuttings from the borehole.
11. A real time method for measuring efficiency of a sweep in removing cuttings from a borehole penetrating a subterranean formation, said method comprising:

determining the mass in of the sweep;
using real time pressure-while-drilling tool data in determining the mass out of

the sweep; and
subtracting at the borehole site the mass in of the sweep from the mass out of
the sweep.